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**AMENDMENTS TO CLAIMS**

**Claim 1 (previously presented): An apparatus for characterizing one or more material properties for each of 5 or more samples, comprising:**

**a substrate having 5 or more sensors disposed thereon to form a sensor array, wherein each sensor is associated with one of said 5 or more samples and characterizes at least one thermal property of said one of said 5 or more samples;**

**an interconnection device electrically coupled with the sensor array; and**

**an electronic platform that sends signals to and receives signals from said sensor array via said interconnection device, wherein the signals received by said electronic platform correspond to said at least one thermal property and wherein said sensor array includes a plurality of thermometers disposed on a top surface of said substrate, and wherein said substrate includes a large area heater disposed on a bottom surface of said substrate.**

**Claim 2 (previously presented): An apparatus for characterizing one or more material properties for each of 5 or more samples, comprising:**

**a substrate having 5 or more sensors disposed thereon to form a sensor array, wherein each sensor is associated with one of said 5 or more samples and characterizes at least one thermal property of said one of said 5 or more samples;**

**a circuit board coupled to said sensor array;**

**a signal routing means coupled to said sensor array via said circuit board; and**

**an electronic platform that sends signals to and receives signals from said sensor array via said signal routing means, wherein said signal routing means selectively couples a sensor or a group of sensors in said sensor array to said electronic platform, and wherein the signals received by said electronic platform correspond to said at least one thermal property and wherein said sensor array includes a plurality of thermometers disposed on a top surface of said substrate, and wherein said substrate includes a large area heater disposed on a bottom surface of said substrate.**

**Claim 3 (previously presented): An apparatus for characterizing one or more material properties for each of 5 or more samples, comprising:**

**a substrate having 5 or more sensors disposed thereon to form a sensor array, wherein each sensor is associated with one of said 5 or more samples and characterizes at least one thermal property of said one of said 5 or more samples;**

**a circuit board coupled to said sensor array via a connector, said circuit board having a signal routing means disposed thereon;**

**an electronic platform that sends signals to and receives signals from said sensor array via said signal routing means, wherein said signal routing means on said circuit board selectively couples a sensor or a group of sensors in said sensor array to said electronic platform, and wherein the signals received by said electronic platform correspond to at least one thermal property and wherein said sensor array includes a plurality of thermometers disposed on a top surface of said substrate, and wherein said substrate includes a large area heater disposed on a bottom surface of said substrate.**

**Claim 4 (currently amended): An apparatus for characterizing one or more material properties for each of 5 or more samples, comprising:**

**a substrate having 5 or more sensors disposed thereon to form a sensor array, wherein each sensor is associated with one of said 5 or more samples and characterizes at least one thermal property of said one of said 5 or more samples;**

**a circuit board including:**

**a signal routing means; and**

**electronic test circuitry for sending signals to and receiving signals from said sensor array via said signal routing means, wherein the signals received by said electronic test circuitry correspond to said at least one thermal property of said one of said 5 or more samples, and wherein said signal routing means on said circuit board selectively couples a sensor or a group of sensors in said sensor array to said electronic test circuitry; and**

**a computer coupled to said circuit board for controlling said signal routing means and said electronic test circuitry, receiving signals generated by said electronic test circuitry, and generating data corresponding to said at least one**

thermal property and wherein said sensor array includes a plurality of thermometers disposed on a top surface of said substrate, and wherein said substrate includes a large area heater disposed on a bottom surface of said substrate.

**Claim 5 (previously presented):** An apparatus for characterizing material properties in a materials library, comprising:

a circuit board including:

a plurality of sensors disposed on said circuit board to form a sensor array, wherein each sensor in said sensor array measures at least one property of a material in the materials library;

a signal routing means; and

electronic test circuitry for sending signals to and receiving signals from said sensor array via said signal routing means, wherein the signals received by said electronic test circuitry correspond to said at least one property of a material in the materials library; and

a computer for controlling said plurality of sensors and said electronic test circuitry, receiving signals generated by said electronic test circuitry, and generating data corresponding to said at least one property of a material in the materials library and wherein said sensor array includes a plurality of thermometers disposed on a top surface of a substrate of said circuit board, and wherein said substrate includes a large area heater disposed on a bottom surface of said substrate.

**Claim 6 (previously presented):** An apparatus for characterizing material properties in a materials library, comprising:

a circuit board including:

a plurality of sensors disposed on a substrate mounted on said circuit board to form a sensor array, wherein each sensor in said sensor array measures at least one property of a material in the materials library; and

a signal routing means to route signals to and from said plurality of sensors; and

electronic test circuitry for sending signals to and receiving signals from said sensor array, wherein the signals received by said electronic test circuitry

correspond to said at least one property of a material in the materials library;  
and

a computer for controlling said plurality of sensors and said electronic test circuitry, receiving signals generated by said electronic test circuitry, and generating data corresponding to said at least one property of a material in the materials library and wherein said sensor array includes a plurality of thermometers disposed on a top surface of said substrate, and wherein said substrate includes a large area heater disposed on a bottom surface of said substrate

Claim 7 (canceled)

Claim 8 (currently amended): The apparatus of claim 1, 2, 3 or 4, wherein the at least one thermal property characterized by said sensor array is at least one selected from the group consisting of heat capacity, thermal conductivity, and thermal stability.

Claim 9 (currently amended): The apparatus of claim 1, 2, 3, 4, 5 or 6, wherein at least one sensor in said sensor array comprises:

a microthin film membrane supported by said substrate such that said sensor array is an array of microthin film windows; and

a heater/thermometer pattern disposed on said microthin film membrane.

Claim 10 (currently amended): The apparatus of claim 9, wherein said microthin film membrane forming said at least one sensor is a silicon nitride membrane, and wherein said substrate supporting said silicon nitride membrane in said sensor array is a silicon wafer.

Claim 11 (canceled)

Claim 12 (canceled)

**Claim 13 (previously presented):** The apparatus of claim 1, 2, 3, 4, 5 or 6, wherein said substrate is made of a polymer sheet, and wherein said sensor array includes a plurality of heaters/thermometers disposed on said polymer sheet.

**Claim 14 (original):** The apparatus of claim 13, wherein said polymer sheet is a polyimide.

**Claim 15 (previously presented):** The apparatus of claim 13, wherein said plurality of heaters/thermometers is printed on said polymer sheet via lithography.

**Claim 16 (previously presented):** The apparatus of claim 1, 2, 3, 4, 5 or 6, wherein said substrate is made of a poor thermal conducting material that is at least 100 microns thick, and wherein said sensor array includes a plurality of heaters/thermometers disposed on said poor thermal conducting material.

**Claim 17 (previously presented):** The apparatus of claim 16, wherein said plurality of heaters/thermometers is printed on a glass plate via lithography.

**Claim 18 (canceled)**

**Claim 19 (previously presented):** The apparatus of claim 1, 2, 3, 4, 5 or 6, wherein said substrate is made of a polymer sheet.

**Claim 20 (previously presented):** The apparatus of claim 1, 2, 3, 4, 5 or 6, wherein said substrate is made from a material having poor thermal conductivity and is placed on a heater block, and wherein said sensor array includes a plurality of temperature sensors disposed on the substrate such that a temperature difference between a first portion and a second portion of the substrate can be determined.

**Claim 21 (original):** The apparatus of claim 20, wherein said substrate is a glass plate.

Claim 22 (canceled)

Claim 23 (previously presented): The apparatus of claim 1, 2, 3, or 4, wherein the at least one thermal property characterized by said sensor array is a complex dielectric constant.

Claim 24 (previously presented): The apparatus of claim 23, wherein at least one sensor in said sensor array comprises interdigitated electrodes disposed on said substrate.

Claim 25 (previously presented): The apparatus of claim 1, 2, 3, 4, 5 or 6, wherein at least one sensor in said sensor array further comprises a thermometer such that said at least one sensor can conduct a dielectric constant measurement and a thermal measurement simultaneously.

Claims 26-112 (canceled)

Claim 113 (currently amended): An apparatus for characterizing one or more material properties for each of 5 or more samples, comprising:

a substrate having 5 or more sensors disposed thereon to form a sensor array, wherein each sensor is associated with one of said 5 or more samples and characterizes at least one thermal property of said one of said 5 or more samples;

an interconnection device electrically coupled with the sensor array; and an electronic platform that sends signals to and receives signals from said sensor array via said interconnection device, wherein the signals received by said electronic platform correspond to said at least one thermal property and wherein at least one sensor in said sensor array comprises:

- i) a microthin film membrane supported by said substrate such that said sensor array is an array of microthin film windows;
- ii) a first wire disposed on said microthin film membrane, said first wire acting as a heater and a first thermometer; and

- iii) a second wire spaced apart from said first wire and disposed on said substrate, said second wire acting as a second thermometer.

**Claim 114 (currently amended):** An apparatus for characterizing one or more material properties for each of 5 or more samples, comprising:

a substrate having 5 or more sensors disposed thereon to form a sensor array, wherein each sensor is associated with one of said 5 or more samples and characterizes at least one thermal property of said one of said 5 or more samples;

a circuit board coupled to said sensor array;

a signal routing means coupled to said sensor array via said circuit board; and

an electronic platform that sends signals to and receives signals from said sensor array via said signal routing means, wherein said signal routing means selectively couples a sensor or a group of sensors in said sensor array to said electronic platform, and wherein the signals received by said electronic platform correspond to said at least one thermal property and wherein at least one sensor in said sensor array comprises:

- i) a microthin film membrane supported by said substrate such that said sensor array is an array of microthin film windows;
- ii) a first wire disposed on said microthin film membrane, said first wire acting as a heater and a first thermometer; and
- iii) a second wire spaced apart from said first wire and disposed on said substrate, said second wire acting as a second thermometer.

**Claim 115 (currently amended):** An apparatus for characterizing one or more material properties for each of 5 or more samples, comprising:

a substrate having 5 or more sensors disposed thereon to form a sensor array, wherein each sensor is associated with one of said 5 or more samples and characterizes at least one thermal property of said one of said 5 or more samples;

a circuit board coupled to said sensor array via a connector, said circuit board having a signal routing means disposed thereon;

an electronic platform that sends signals to and receives signals from said sensor array via said signal routing means, wherein said signal routing means on

said circuit board selectively couples a sensor or a group of sensors in said sensor array to said electronic platform, and wherein the signals received by said electronic platform correspond to at least one thermal property and wherein at least one sensor in said sensor array comprises:

- i) a microthin film membrane supported by said substrate such that said sensor array is an array of microthin film windows;
- ii) a first wire disposed on said microthin film membrane, said first wire acting as a heater and a first thermometer; and
- iii) a second wire spaced apart from said first wire and disposed on said substrate, said second wire acting as a second thermometer.

Claim 116 (currently amended): An apparatus for characterizing one or more material properties for each of 5 or more samples, comprising:

a substrate having 5 or more sensors disposed thereon to form a sensor array, wherein each sensor is associated with one of said 5 or more samples and characterizes at least one thermal property of said one of said 5 or more samples;

a circuit board including:

a signal routing means; and

electronic test circuitry for sending signals to and receiving signals from said sensor array via said signal routing means, wherein the signals received by said electronic test circuitry correspond to said at least one thermal property of said one of said 5 or more samples, and wherein said signal routing means on said circuit board selectively couples a sensor or a group of sensors in said sensor array to said electronic test circuitry; and

a computer coupled to said circuit board for controlling said signal routing means and said electronic test circuitry, receiving signals generated by said electronic test circuitry, and generating data corresponding to said at least one thermal property and wherein at least one sensor in said sensor array comprises:

- i) a microthin film membrane supported by said substrate such that said sensor array is an array of microthin film windows;
- ii) a first wire disposed on said microthin film membrane, said first wire acting as a heater and a first thermometer; and



- iii) a second wire spaced apart from said first wire and disposed on said substrate, said second wire acting as a second thermometer.

**Claim 117 (currently amended):** An apparatus for characterizing material properties in a materials library, comprising:

a circuit board including:

a plurality of sensors disposed on said circuit board to form a sensor array, wherein each sensor in said sensor array measures at least one property of a material in the materials library;

a signal routing means; and

electronic test circuitry for sending signals to and receiving signals from said sensor array via said signal routing means, wherein the signals received by said electronic test circuitry correspond to said at least one property of a material in the materials library; and

a computer for controlling said plurality of sensors and said electronic test circuitry, receiving signals generated by said electronic test circuitry, and generating data corresponding to said at least one property of a material in the materials library and wherein at least one sensor in said sensor array comprises:

- i) a microthin film membrane supported by a substrate of said circuit board such that said sensor array is an array of microthin film windows;
- ii) a first wire disposed on said microthin film membrane, said first wire acting as a heater and a first thermometer; and
- iii) a second wire spaced apart from said first wire and disposed on said circuit board, said second wire acting as a second thermometer.

**Claim 118 (currently amended):** An apparatus for characterizing material properties in a materials library, comprising:

a circuit board including:

a plurality of sensors disposed on a substrate mounted on said circuit board to form a sensor array, wherein each sensor in said sensor array measures at least one property of a material in the materials library; and

a signal routing means to route signals to and from said plurality of sensors;

electronic test circuitry for sending signals to and receiving signals from said sensor array, wherein the signals received by said electronic test circuitry correspond to said at least one property of a material in the materials library; and

a computer for controlling said plurality of sensors and said electronic test circuitry, receiving signals generated by said electronic test circuitry, and generating data corresponding to said at least one property of a material in the materials library and wherein at least one sensor in said sensor array comprises:

- i) a microthin film membrane supported by said substrate such that said sensor array is an array of microthin film windows;
- ii) a first wire disposed on said microthin film membrane, said first wire acting as a heater and a first thermometer; and
- iii) a second wire spaced apart from said first wire and disposed on said substrate, said second wire acting as a second thermometer.

Claim 119 (previously presented): An apparatus for characterizing one or more material properties for each of 5 or more samples, comprising:

a substrate having 5 or more sensors disposed thereon to form a sensor array, wherein each sensor is associated with one of said 5 or more samples and characterizes at least one thermal property of said one of said 5 or more samples;

an interconnection device electrically coupled with the sensor array; and

an electronic platform that sends signals to and receives signals from said sensor array via said interconnection device, wherein the signals received by said electronic platform correspond to said at least one thermal property and wherein at least one sensor in said sensor array comprises:

a sample support with a thermal measurement pattern disposed thereon;

a gap between said sample support and said substrate for thermally isolating said sample support from said substrate; and

a plurality of bridges connecting said sample support to said substrate over said gap.

**Claim 120 (previously presented):** An apparatus for characterizing one or more material properties for each of 5 or more samples, comprising:

a substrate having 5 or more sensors disposed thereon to form a sensor array, wherein each sensor is associated with one of said 5 or more samples and characterizes at least one thermal property of said one of said 5 or more samples;

a circuit board coupled to said sensor array;

a signal routing means coupled to said sensor array via said circuit board; and

an electronic platform that sends signals to and receives signals from said sensor array via said signal routing means, wherein said signal routing means selectively couples a sensor or a group of sensors in said sensor array to said electronic platform, and wherein the signals received by said electronic platform correspond to said at least one thermal property and wherein at least one sensor in said sensor array comprises:

a sample support with a thermal measurement pattern disposed thereon;

a gap between said sample support and said substrate for thermally isolating said sample support from said substrate; and

a plurality of bridges connecting said sample support to said substrate over said gap.

**Claim 121 (previously presented):** An apparatus for characterizing one or more material properties for each of 5 or more samples, comprising:

a substrate having 5 or more sensors disposed thereon to form a sensor array, wherein each sensor is associated with one of said 5 or more samples and characterizes at least one thermal property of said one of said 5 or more samples;

a circuit board coupled to said sensor array via a connector, said circuit board having a signal routing means disposed thereon;

an electronic platform that sends signals to and receives signals from said sensor array via said signal routing means, wherein said signal routing means on

said circuit board selectively couples a sensor or a group of sensors in said sensor array to said electronic platform, and wherein the signals received by said electronic platform correspond to at least one thermal property and wherein at least one sensor in said sensor array comprises:

- a sample support with a thermal measurement pattern disposed thereon;

- a gap between said sample support and said substrate for thermally isolating said sample support from said substrate; and

- a plurality of bridges connecting said sample support to said substrate over said gap.

Claim 122 (previously presented): An apparatus for characterizing one or more material properties for each of 5 or more samples, comprising:

- a substrate having 5 or more sensors disposed thereon to form a sensor array, wherein each sensor is associated with one of said 5 or more samples and characterizes at least one thermal property of said one of said 5 or more samples;

- a circuit board including:

- a signal routing means; and

- electronic test circuitry for sending signals to and receiving signals from said sensor array via said signal routing means, wherein the signals received by said electronic test circuitry correspond to said at least one thermal property of said one of said 5 or more samples, and wherein said signal routing means on said circuit board selectively couples a sensor or a group of sensors in said sensor array to said electronic test circuitry; and

- a computer coupled to said circuit board for controlling said signal routing means and said electronic test circuitry, receiving signals generated by said electronic test circuitry, and generating data corresponding to said at least one thermal property and wherein at least one sensor in said sensor array comprises:

- a sample support with a thermal measurement pattern disposed thereon;

- a gap between said sample support and a substrate of said circuit board for thermally isolating said sample support from said substrate; and

a plurality of bridges connecting said sample support to said substrate over said gap.

**Claim 123 (previously presented):** An apparatus for characterizing material properties in a materials library, comprising:

a circuit board including:

a plurality of sensors disposed on said circuit board to form a sensor array, wherein each sensor in said sensor array measures at least one property of a material in the materials library;

a signal routing means; and

electronic test circuitry for sending signals to and receiving signals from said sensor array via said signal routing means, wherein the signals received by said electronic test circuitry correspond to said at least one property of a material in the materials library; and

a computer for controlling said plurality of sensors and said electronic test circuitry, receiving signals generated by said electronic test circuitry, and generating data corresponding to said at least one property of a material in the materials library and wherein at least one sensor in said sensor array comprises:

a sample support with a thermal measurement pattern disposed thereon;

a gap between said sample support and a substrate of the circuit board for thermally isolating said sample support from said substrate; and

a plurality of bridges connecting said sample support to said substrate over said gap.

**Claim 124 (previously presented):** An apparatus for characterizing material properties in a materials library, comprising:

a circuit board including:

a plurality of sensors disposed on a substrate mounted on said circuit board to form a sensor array, wherein each sensor in said sensor array measures at least one property of a material in the materials library; and

a signal routing means to route signals to and from said plurality of sensors;

electronic test circuitry for sending signals to and receiving signals from said sensor array, wherein the signals received by said electronic test circuitry correspond to said at least one property of a material in the materials library, and

a computer for controlling said plurality of sensors and said electronic test circuitry, receiving signals generated by said electronic test circuitry, and generating data corresponding to said at least one property of a material in the materials library and wherein at least one sensor in said sensor array comprises:

a sample support with a thermal measurement pattern disposed thereon;

a gap between said sample support and said substrate for thermally isolating said sample support from said substrate; and

a plurality of bridges connecting said sample support to said substrate over said gap.

Claim 125 (previously presented): An apparatus for characterizing one or more electrical transport properties for each of 5 or more samples, comprising:

a substrate having 5 or more sensors disposed thereon to form a sensor array, wherein each sensor is associated with one of said 5 or more samples and characterizes at least one electrical transport property of said one of said 5 or more samples;

an interconnection device electrically coupled with the sensor array; and

an electronic platform that sends signals to and receives signals from said sensor array via said interconnection device, wherein the signals received by said electronic platform correspond to said at least one electrical transport property; and

a means for generating a magnetic field pointing perpendicular to said substrate wherein said generating means comprises a magnet array having a plurality of magnets arranged in the same format as said sensors in said sensor array, wherein each magnet in said magnet array corresponds with a sensor in said sensor array to generate a magnetic field over the corresponding sensor.

**Claim 126 (previously presented): An apparatus for characterizing one or more material properties for each of 5 or more samples, comprising:**

**a substrate having 5 or more sensors disposed thereon to form a sensor array, wherein each sensor is associated with one of said 5 or more samples and characterizes at least one electrical transport property of said one of said 5 or more samples;**

**a circuit board coupled to said sensor array;**

**a signal routing means coupled to said sensor array via said circuit board; and**

**an electronic platform that sends signals to and receives signals from said sensor array via said signal routing means, wherein said signal routing means selectively couples a sensor or a group of sensors in said sensor array to said electronic platform, and wherein the signals received by said electronic platform correspond to said at least one electrical transport property; and**

**a means for generating a magnetic field pointing perpendicular to said substrate wherein said generating means comprises a magnet array having a plurality of magnets arranged in the same format as said sensors in said sensor array, wherein each magnet in said magnet array corresponds with a sensor in said sensor array to generate a magnetic field over the corresponding sensor.**

**Claim 127 (previously presented): An apparatus for characterizing one or more material properties for each of 5 or more samples, comprising:**

**a substrate having 5 or more sensors disposed thereon to form a sensor array, wherein each sensor is associated with one of said 5 or more samples and characterizes at least one electrical transport property of said one of said 5 or more samples;**

**a circuit board coupled to said sensor array via a connector, said circuit board having a signal routing means disposed thereon;**

**an electronic platform that sends signals to and receives signals from said sensor array via said signal routing means, wherein said signal routing means on said circuit board selectively couples a sensor or a group of sensors in said sensor array to said electronic platform, and wherein the signals received by said electronic platform correspond to at least one electrical transport property; and**

a means for generating a magnetic field pointing perpendicular to said substrate wherein said generating means comprises a magnet array having a plurality of magnets arranged in the same format as said sensors in said sensor array, wherein each magnet in said magnet array corresponds with a sensor in said sensor array to generate a magnetic field over the corresponding sensor.

**Claim 128 (previously presented):** An apparatus for characterizing one or more material properties for each of 5 or more samples, comprising:

a substrate having 5 or more sensors disposed thereon to form a sensor array, wherein each sensor is associated with one of said 5 or more samples and characterizes at least one electrical transport property of said one of said 5 or more samples;

a circuit board including:

a signal routing means; and

electronic test circuitry for sending signals to and receiving signals from said sensor array via said signal routing means, wherein the signals received by said electronic test circuitry correspond to said at least one electrical transport property of said one of said 5 or more samples and wherein said signal routing means on said circuit board selectively couples a sensor or a group of sensors in said sensor array to said electronic test circuitry; and

a computer coupled to said circuit board for controlling said signal routing means and said electronic test circuitry, receiving signals generated by said electronic test circuitry, and generating data corresponding to said at least one electrical transport property; and

a means for generating a magnetic field pointing perpendicular to a substrate of the circuit board wherein said generating means comprises a magnet array having a plurality of magnets arranged in the same format as said sensors in said sensor array, wherein each magnet in said magnet array corresponds with a sensor in said sensor array to generate a magnetic field over the corresponding sensor.

**Claim 129 (previously presented):** An apparatus for characterizing material properties in a materials library, comprising:



a circuit board including:

a plurality of sensors disposed on said circuit board to form a sensor array, wherein each sensor in said sensor array measures at least one electrical transport property of a material in the materials library;

a signal routing means; and

electronic test circuitry for sending signals to and receiving signals from said sensor array via said signal routing means, wherein the signals received by said electronic test circuitry correspond to said at least one electrical transport property of a material in the materials library; and

a computer for controlling said plurality of sensors and said electronic test circuitry, receiving signals generated by said electronic test circuitry, and generating data corresponding to said at least one electrical transport property of a material in the materials library; and

a means for generating a magnetic field pointing perpendicular to a substrate of the circuit board wherein said generating means comprises a magnet array having a plurality of magnets arranged in the same format as said sensors in said sensor array, wherein each magnet in said magnet array corresponds with a sensor in said sensor array to generate a magnetic field over the corresponding sensor.

Claim 130 (previously presented): An apparatus for characterizing material properties in a materials library, comprising:

a circuit board including:

a plurality of sensors disposed on a substrate mounted on said circuit board to form a sensor array, wherein each sensor in said sensor array measures at least one electrical transport property of a material in the materials library; and

a signal routing means to route signals to and from said plurality of sensors;

electronic test circuitry for sending signals to and receiving signals from said sensor array, wherein the signals received by said electronic test circuitry correspond to said at least one electrical transport property of a material in the materials library; and

a computer for controlling said plurality of sensors and said electronic test circuitry, receiving signals generated by said electronic test circuitry, and generating data corresponding to said at least one electrical transport property of a material in the materials library; and

a means for generating a magnetic field pointing perpendicular to said substrate wherein said generating means comprises a magnet array having a plurality of magnets arranged in the same format as said sensors in said sensor array, wherein each magnet in said magnet array corresponds with a sensor in said sensor array to generate a magnetic field over the corresponding sensor.

Claim 131 (currently amended): The apparatus of claim 113, 114, 115, 116, 119, 120, 121, or 122, wherein the at least one thermal property characterized by said sensor array is at least one selected from the group consisting of heat capacity, thermal conductivity, and thermal stability.

Claim 132 (currently amended): The apparatus of claim 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123 or 124, wherein at least one sensor in said sensor array comprises:

a ~~micro~~thin film membrane supported by said substrate such that said sensor array is an array of ~~micro~~thin film windows; and

a heater/thermometer pattern disposed on said ~~micro~~thin film membrane.

Claim 133 (currently amended): The apparatus of claim 132, wherein said ~~micro~~thin film membrane forming said at least one sensor is a silicon nitride membrane, and wherein said substrate supporting said silicon nitride membrane in said sensor array is a silicon wafer.

Claim 134 (canceled)

Claim 135 (previously presented): The apparatus of claim 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123 or 124, wherein said substrate is made of a polymer

sheet, and wherein said sensor array includes a plurality of heaters/thermometers disposed on said polymer sheet.

Claim 136 (previously presented): The apparatus of claim 135, wherein said polymer sheet is a polyimide.

Claim 137 (previously presented): The apparatus of claim 135, wherein said plurality of heaters/thermometers is printed on said polymer sheet via lithography.

Claim 138 (previously presented): The apparatus of claim 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123 or 124, wherein said substrate is made of a poor thermal conducting material that is at least 100 microns thick, and wherein said sensor array includes a plurality of heaters/thermometers disposed on said poor thermal conducting material.

Claim 139 (previously presented): The apparatus of claim 138, wherein said plurality of heaters/thermometers is printed on a glass plate via lithography.

Claim 140 (previously presented): The apparatus of claim 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123 or 124, wherein said substrate is made of a polymer sheet.

Claim 141 (previously presented): The apparatus of claim 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123 or 124, wherein said substrate is made from a material having poor thermal conductivity and is placed on a heater block, and wherein said sensor array includes a plurality of temperature sensors disposed on the substrate such that a temperature difference between a first portion and a second portion of the substrate can be determined.

Claim 142 (previously presented): The apparatus of claim 141, wherein said substrate is a glass plate.

Claim 143 (currently amended): The apparatus of claim 113, 114, 115, 116, 119, 120, 121, or 122, wherein the at least one thermal property characterized by said sensor array is a complex dielectric constant.

Claim 144 (previously presented): The apparatus of claim 143, wherein at least one sensor in said sensor array comprises interdigitated electrodes disposed on said substrate.

Claim 145 (previously presented): The apparatus of claim 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123 or 124, wherein at least one sensor in said sensor array further comprises a thermometer such that said at least one sensor can conduct a dielectric constant measurement and a thermal measurement simultaneously.

Claim 146 (previously presented): The apparatus of claims 125, 126, 127, 128, 129 or 130, wherein the at least one electrical transport property characterized by said sensor array is at least one selected from the group of electrical resistance, Hall coefficient, magnetoresistance, thermoelectric power, and current-voltage characteristics.

Claim 147 (previously presented): The apparatus of claim 125, 126, 127, 128, 129 or 130, wherein at least one sensor on the sensor array comprises a plurality of electrical leads disposed on the substrate.

Claim 148 (previously presented): The apparatus of claim 125, 126, 127 or 128, wherein a plurality of electrical leads are deposited on said substrate, and wherein said 5 or more samples are deposited on top of said plurality of electrical leads.

Claim 149 (previously presented): The apparatus of claim 125, 126, 127 or 128, wherein said 5 or more samples are deposited on said substrate, and wherein a plurality of electrical leads are deposited on top of said 5 or more samples.

**Claim 150 (previously presented):** The apparatus of claim 125, 126, 127, 128, 129 or 130, wherein said generating means comprises a magnet that generates a magnetic field over the entire sensor array.

**Claim 151 (previously presented):** The apparatus of claim 125, 126, 127, or 128, further comprising means for imposing a temperature gradient across said 5 or more samples in said sensor array.

**Claim 152 (previously presented):** The apparatus of claim 125, 126, 127, 128, 129 or 130, wherein said sensors in said sensor array further measure temperature, and wherein said apparatus further comprises a plurality of temperature controlled elements to impose a temperature gradient across at least one sample in said sensor array.

**Claim 153 (previously presented):** The apparatus of claim 5 or 6, wherein the at least one property characterized by said sensor array is at least one selected from the group consisting of heat capacity, thermal conductivity, and thermal stability.

**Claim 154 (previously presented):** The apparatus of claim 5 or 6, wherein the at least one property characterized by said sensor array is a complex dielectric constant.

**Claim 155 (previously presented):** The apparatus of claim 117, 118, 123 or 124, wherein the at least one property characterized by said sensor array is at least one selected from the group consisting of heat capacity, thermal conductivity, and thermal stability.

**Claim 156 (previously presented):** The apparatus of claim 117, 118, 123 or 124, wherein the at least one property characterized by said sensor array is a complex dielectric constant.

**Claim 157 (new):** The apparatus of claim 1, 2, 3, 4, 5 or 6 wherein the at least 5 samples are each solid state materials.

**Claim 158 (new):** The apparatus of claim 1, 2, 3, 4, 5 or 6 wherein the at least 5 sensors at least partially respectively carry the at least 5 samples.

**Claim 159 (new):** The apparatus of claim 1, 2, 3, 5 or 6 wherein each of the at least 5 samples have lateral dimensions of 1 mm or less.

**Claim 160 (new):** The apparatus of claim 1, 2, 3, 4, 5 or 6 wherein each of the at least 5 samples are thermally isolated from each other.

**Claim 161 (new):** The apparatus of claim 1, 2, 3, 4, 5 or 6 wherein each of the at least 5 samples are different from each other.

**Claim 162 (new):** The apparatus of claim 1, 2, 3, 4, 5 or 6 wherein the substrate includes at least 48 sensors.

**Claim 163 (new):** The apparatus of claim 1, 2, 3, 4, 5 or 6 wherein each of the at least 5 samples are polymeric materials.

**Claim 164 (new):** The apparatus of claim 1, 2, 3 or 4 further comprising a computer configured for displaying data of the at least one thermal property.

**Claim 165 (new):** The apparatus of claim 5 or 6 further comprising a computer configured for displaying data of the at least one property.